Umetco Minerals Corporation

PO BOX 579 4625 ROYAL AVENUE • NIAGARA FALLS, NEW YORK 14302

May 9, 1986

Mr. Robert F. Kelly
Associate Radiophysicist
State of New York - Department of Labor
65 Court Street
Buffalo, NY 14202

Subject: Umetco Minerals Corporation, Niagara Falls, NY

Dear Mr. Kelly:

Thank you for taking the time on Wednesday, May 7, 1986 to discuss with Bob Beverly and me our plans to complete the cleanup of radioactive material found in the Niagara Plant. After my letter of March 25 to you, we obtained samples of the areas in question and submitted these to EDA Instruments Inc. in Colorado for radiochemical analyses. That results shown in Table 1 were the basis for our discussion

I was concerned that we may have been misinterpreting Industrial Code Rule 38 but you kindly gave us a copy of an Inter-Office memo from Dr. Bradley to you dated March 26, 1982 which specified the limits for source material. This memo is appended.

Below I have summarized the topics we discussed and outlined the actions we plan to take.

A Material from Pit in Building 24

A gamma radiation level of 170 µR/hr prompted us to remove the illmenite sand that had been used to backfill a 9'-6" x 10' concrete pit in Building 24. The pit was much deeper than anticipated and we filled one hundred twenty-five 55-gallon drums before reaching a depth of 9 feet. Subsequently when we received the results of the analyses (Samples 40-6 and 40-7) it was evident that the material contained less than 500 parts per million of combined uranium and thorium. This, coupled with a gamma radiation level well below 250 µR/hr, led to the conclusion that this material did not exceed the "Limits for Uncontrolled Areas" as specified in Table 5 of Code Rule 38. You concurred with this conclusion.

As we discussed, I plan to use this material as partial fill for a low area in the yard east of No. 6 Furnace Building. The pit will be backfilled with fresh soil or sand. However, as agreed, I will not proceed with this plan until after May 15 to allow you time to think more about it and possibly confer with Dr. Bradley.

B. Slag East of No. 6 Furnace Building

This is what you refer to as the "rock area" in your Investigative Report of March 26 (appended). Since that date we were able to move the slag pile and found that it was the slag itself and not the ground that was radioactive. As we discussed I was puzzled at the relatively high reading of Th-230 in Samples 40-3 and 40-4. Because the Th-230 is in the decay chain of U-238 I would have expected the uranium analyses to be appreciably higher. The explanation is probably that some uranium oxide impurity was inadvertently introduced to a few vanadium aluminum furnace heats and the uranium passed on to the metal and the thorium went with the slag.

As Bob Beverly discussed, although the Th-230 analyses were 299 and 466 ρCi/g, these represent very small quantities of the pure nuclide (1.53×10^{-8} and 2.39×10^{-8} grams of Th-230 per gram of slag). The calculations are included as Appendix 3.

Again, since this material contains much less than .05% source material and the radiation is less than 250 μR/hr it need not be controlled. I also plan to dispose of it as fill in the yard east of Furnace Room 6.

C. Slag and Soil Contamination South of Furnace No. 30

Sample 40-5 was taken from the slag that had been splattered south of Furnace No. 30. Years ago this furnace had been used to prepare ferrocolumbium. As can be seen, the uranium at 389 μg/g is approaching the 500 μg/g limit and the Th-232 at 241 pCi/g is well above the 55 ρCi/g limit. Seventeen (17) 55-gallon drums of material were removed from around the furnace. Samples 41-2 and 41-3 taken after the cleanup are well within the uncontrolled limits.

D Sample from North of Furnace No. 30

As can be seen from the analyses of Sample 41-1 (Th-232 at 139 ρCi/g) the cleanup was not complete in this area. An additional three 55-gallon drums of material were removed and the gamma radiation dropped from 120 μR/hr to about about 35 to 40 μR/hr. I am convinced we have successfully reduced the radiation to limits for uncontrolled areas. I will defer backfilling until you, as a representative for the Department of Labor, take confirmation samples.

I plan to immediately begin the paper work to secure space and a permit for burial, either at Barnwell, SC or Richland, WA. We will dispose of the material removed from the area surrounding Furnace No. 30 as well as the samples in cans that you refer to in your report of March 1986.

As you know, we are quite anxious to obtain the results of the wipe tests and soil samples taken on Elkem property that hopefully will allow termination of License 210-0090 and License 950-0139. I was pleased to hear that you will have them designated as top priority and will communicate the results to me as soon as you obtain them.

Again I want to thank you for a very pleasant and helpful meeting.

Very truly yours,

Donald J. Hansen

cc: Mr. R. G. Beverly
Mr. F. V. McMillen

mau/369h
Attachments

BLIND COPIES: Messrs:
J. F. Frost
T. J. Kagetsu
D. G. Millenbruch
R. L. Miller
W. D. Smith
C. T. Wentzel

TABLE 1

Radiochemical Analyses of Samples From the Niagara Plant

Sample No.		Description	Analyses: URANIUM SERIES Uranium µg/g	Th-230 pCi/g	THORIUM SERIES Th-232 pCi/g	Th-228 pCi/g	Gamma Radiation µR/hr*
Book 2446		Code Rule 38 Limit	[500]	**	[55]	***	[250]
A	40-6	Bldg. 24 (VA1) Top of Pit	28.9	12±2	16±2	17±2	170
	40-7	Bldg. 24 7' Depth in Pit	44 3	22±2	37±2	39±3	150
B	40-3	Dark Slag-Yard East of Fce. Bldg.	20.2	299±7	16±2	40±9	150
	40-4	Light Slag-Yard East of Fce. Bldg.	18 6	466±9	37±3	14±2	200
C	40-5	Slag Before Digging South of Furnace 30	389	186±6	241±7	241±7	200-420
	41-2	Sample in Front of Fce. 30 After Cleanup	68 4	19±2	35±3	35±3	40
	41-3	Sample from Southwest of Furnace 30 After Cleanup	24.9	6.2±1.1 5.9±1.1	9.6±1.3 8.5±1.3	9.5±1.3 9.2±1.33	30
D	41-1	Sample from North Support of Fce. 30 After Cleanup	122	76±4	139±5	145±5	120
		Area of North Support of Fce. 30 After Second Cleanup	-	-	-	-	35-40

*Ludlum Model 19 Micro R Meter - Reading at surface of location where sample was taken.
**pCi/g equivalent to .05% (500 ppm) calculated to be 9.7×10^6
***pCi/g equivalent to .05% (500 ppm) calculated to be 4.1×10^{11}

APPENDIX 1

NEW YORK STATE DEPARTMENT OF LABOR

INTER-OFFICE MEMORANDUM

To R. Kelly — Date March 26, 1982 — Office RHU

From F.J. Bradley — Office RHU

Subject Union Carbide/Niagara Falls

Based on your survey of December 1, 1981 and the attached results, issue supplemental Notice of Inspection Findings and include our survey results. Require clean up to Table 5 limits within a specified time span. Contact Radiation Safety Officer to arrive at mutually agreable clean up time schedule.

Union Carbide's internal memo dated October 31, 1981 confirms our results and that they are aware of their responsibilities. All we need now is a clean up schedule.

Code Rule 38, Table 5 limits are as follows:

U-nat: 200pCi, $\frac{\text{U-nat}}{\text{gram of soil}}$

Th-nat: 55 pCi, $\frac{\text{Th-nat}}{\text{gram of soil}}$

and external surface dose levels
250 $\frac{\mu R}{hr}$ on surface.

We need to rely on their results with mixed U/Th contamination. I circled soil contamination values above 200 pCi/g (assuming all U-nat).

F.J. Bradley, Ph.D.
Principal Radiophysicist

FJB:bd

APPENDIX 2

STATE OF NEW YORK
DEPARTMENT OF LABOR
STATE OFFICE BUILDING
65 COURT STREET
BUFFALO, N Y 14202

RAMONA L GALLAGHER
Assistant Commissioner of Labor

INVESTIGATIVE REPORT

Umetco - 47th and Royal Avenues, Niagara Falls

Report prepared by Robert F. Kelly on 25 MAR 86.

Report reviewed by _____ on _____.

On 20 MAR 86 after obtaining soil samples on the Umetco property, Dr. Richard Hanson related to me possible "problem" areas when he performed an external radiation survey of the plant facilities a short time ago.

There are four possible problem areas; all seem minor since external readings almost at contact showed levels at about 3-5 times background.

These are described below:

A) "Rock area" outside Building 24 -- This area shows some potential for a bigger problem; rocks on frozen grounds showed the readings mentioned above. Warmer weather will let facility determine what is under these piles.

B) Number 6 Furnace Room in Building 77 - Area shows slight contamination; its mainly on surface and doesn't seem to be a big problem.

C) Building 24 -- dust near furnace. Again doesn't seem to be a big hazard.

D) Samples in cans -- Now located in caged area in Building 25, they will be shipped as radioactive waste.

As related to Dr. Hansen, samples are to be analyzed in all three areas listed above and results sent to the Department. If within the limits, the Department will resurvey premises to insure compliance with Coderule 38.

Robert Kelly
Associate Radiophysicist

APPENDIX 3

Conversion of ρCi to g

$$\text{Specific Activity} = \frac{1.13 \times 10^{13}}{TA} \quad \text{curries per gram of pure nuclide}$$

Where T = half life in seconds
A = mass number

For Th-230

$T = 8.0 \times 10^4$ years $= 8.0 \times 10^4 \times 3.15 \times 10^7 = 2.52 \times 10^{12}$ seconds

$A = 230$

$$\text{Specific Activity per Gram of Th-230} = \frac{1.13 \times 10^{13}}{2.52 \times 10^{12} \times 230} = .0195 \text{ Ci}$$

$$= .0195 \times 10^{12} = 1.95 \times 10^{10} \text{ ρCi}$$

Sample 40-3 299 ρCi/g:

$$\frac{299 \text{ ρCi/g}}{1.95 \times 10^{10} \text{ ρCi/g Th-230}} = 1.53 \times 10^{-8} \text{g Th-230/g}$$

Sample 40-4 466 ρCi/g·

$$\frac{466 \text{ ρCi/g}}{1.95 \times 10^{10} \text{ ρCi/g Th-230}} = 2.39 \times 10^{-8} \text{g Th-230/g}$$